

# ***Headquarters U.S. Air Force***

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***Integrity - Service - Excellence***

## **AIR & SPACE OPERATIONS CENTER (AOC) WEAPON SYSTEM OVERVIEW**



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# ***Overview***

- **Background**
- **AOC Stakeholders**
- **Current Direction**
- **Standardization**
- **Modernization**
- **Industry's Role**
- **Notional LSI Tasks**



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# Background AOC - Evolution of a Weapon System

<2000



- Pre- Weapon System- "A pick-up game"

2000



- CAOC-X & SPO created
- Sep 00--CSAF declared the AOC a Weapon System
- Dec 00-- AOC PE established

2001-03



- Fielded PSAB & AUAB-"Nerve Center for OEF/OIF"
- Began fielding other WS locations: FTU, HD, HTACC

2004→

- Standardization (Falconers, FTU, and HD)

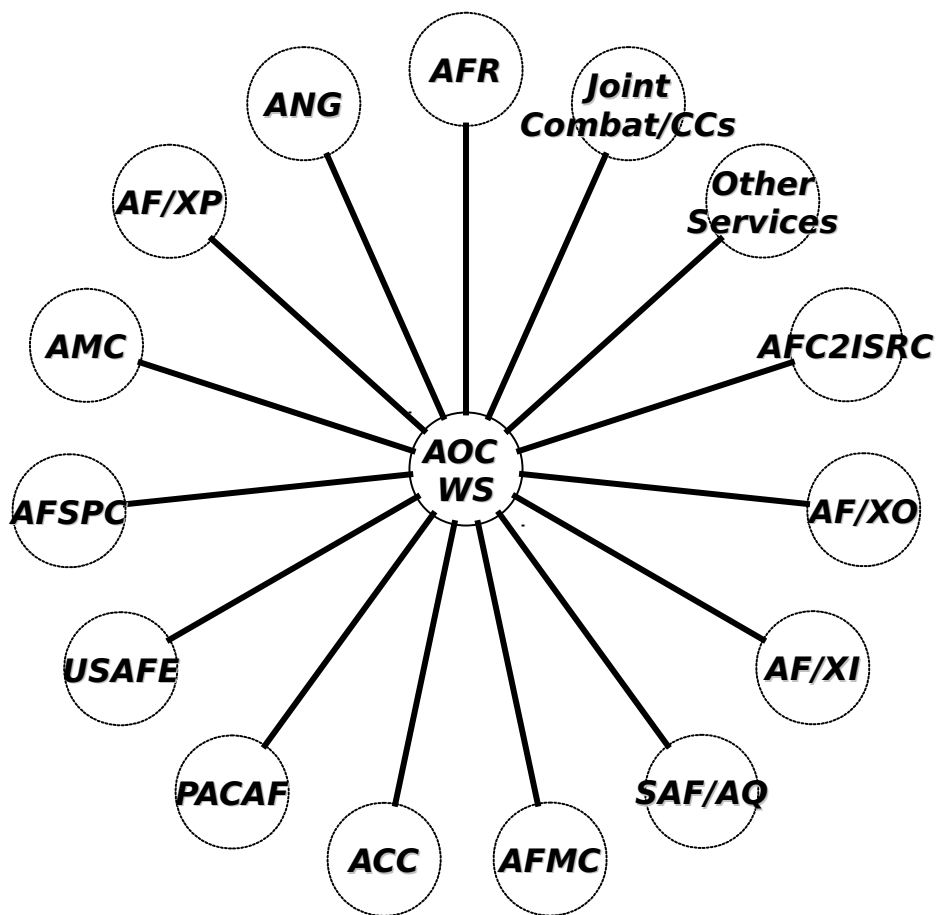


***In FY 04, AF begins to fund AOC as a Weapon System...  
orchestrate 81+ systems and services into a formal baseline***



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# Key AOC Stakeholders





# AOC Programming Guidance

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- We will execute the CSAF's direction for the AOC WS with a two-pronged approach
  - **Standardize - Accelerate IOC and FOC for Block 10.1 (AUAB config)**
    - Three fielding activities started in FY03 (Congressional/OSD funded)
    - Timing of deliveries depends on funding stability
    - Current funding pushes one Falconer into FY06
      - If funding is restored can meet desired timeline
    - Currently rescoping Training Suite Rqts w/ ACC and AFC2ISRC
  - **Modernize to enable Air Force CONOPS via spiral development**
    - Spirals defined and prioritized, development will begin in FY05
    - **Functional AOCs (x5) deferred until FY08-09 due to funding**





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# ***Program Direction***

## ***May 03 AOC Acceleration***

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- **HQ USAF/XI/XO/XP and SAF/AQ message: Accelerating the AOC WS to Full Operational Capability, 6 May 03**
- **Within existing program TOA, accelerate IOC/FOC to a Block 10.1 baseline:**
  - **Field 5 Falconer AOC sites, Formal Training Unit (FTU), and Help Desk to Block 10.1 by FY05**
  - **Upgrade all Augmentation Training Suites (6) to Block 10.1 by FY06**
  - **Plan 3 AF CONOPS Increments (transformational technologies) -technology insertion in FY07**
  - **Block 30 (50% footprint reduction) delayed 3 years (FY10)**
  - **Within available TOA, field other AOCs (5 Functionals, CAOC-N, COAC-T) starting in FY08**
  - **IOC is planned for 4<sup>th</sup> Qtr FY04 and FOC is planned for 4<sup>th</sup> Qtr FY06**



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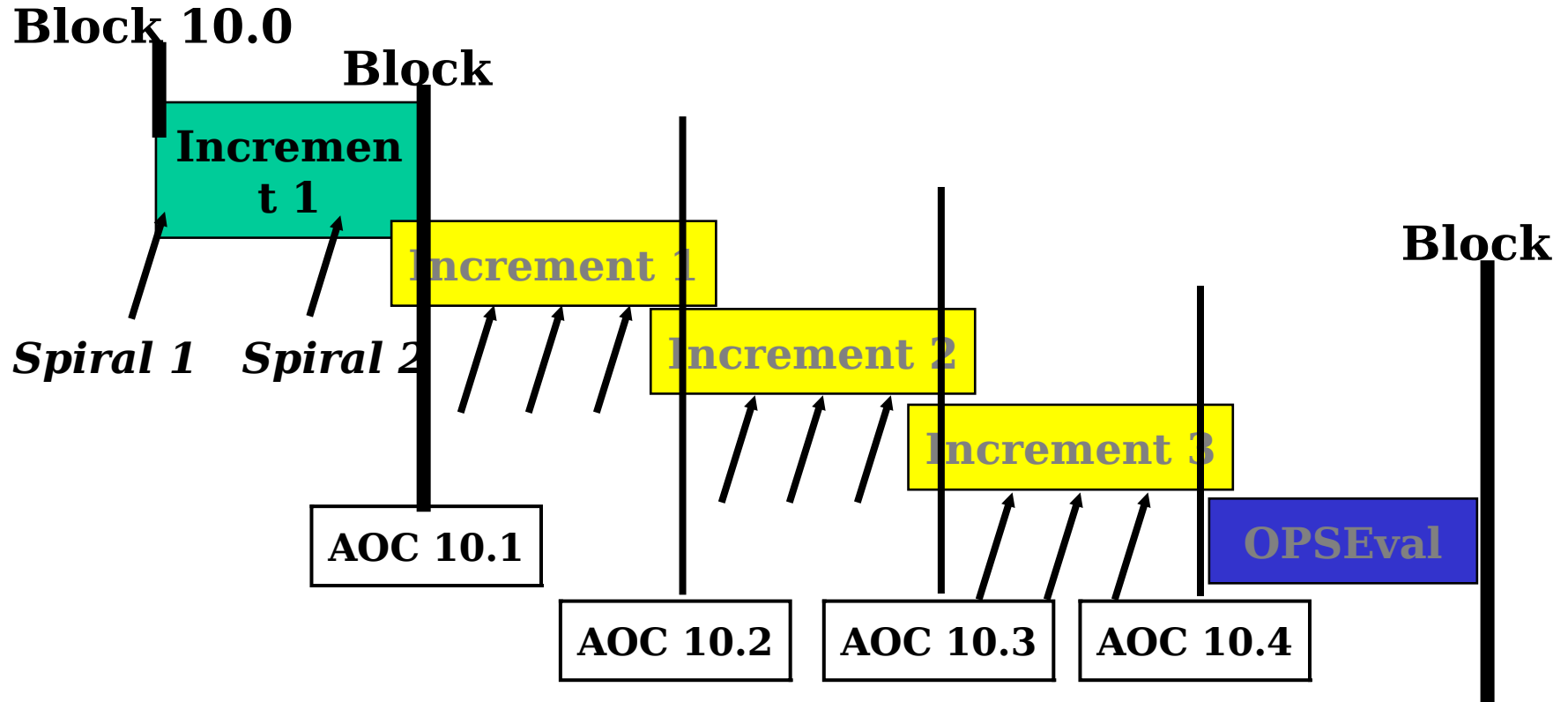
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# **Standardization**



# AOC Spiral Development Strategy (notional)

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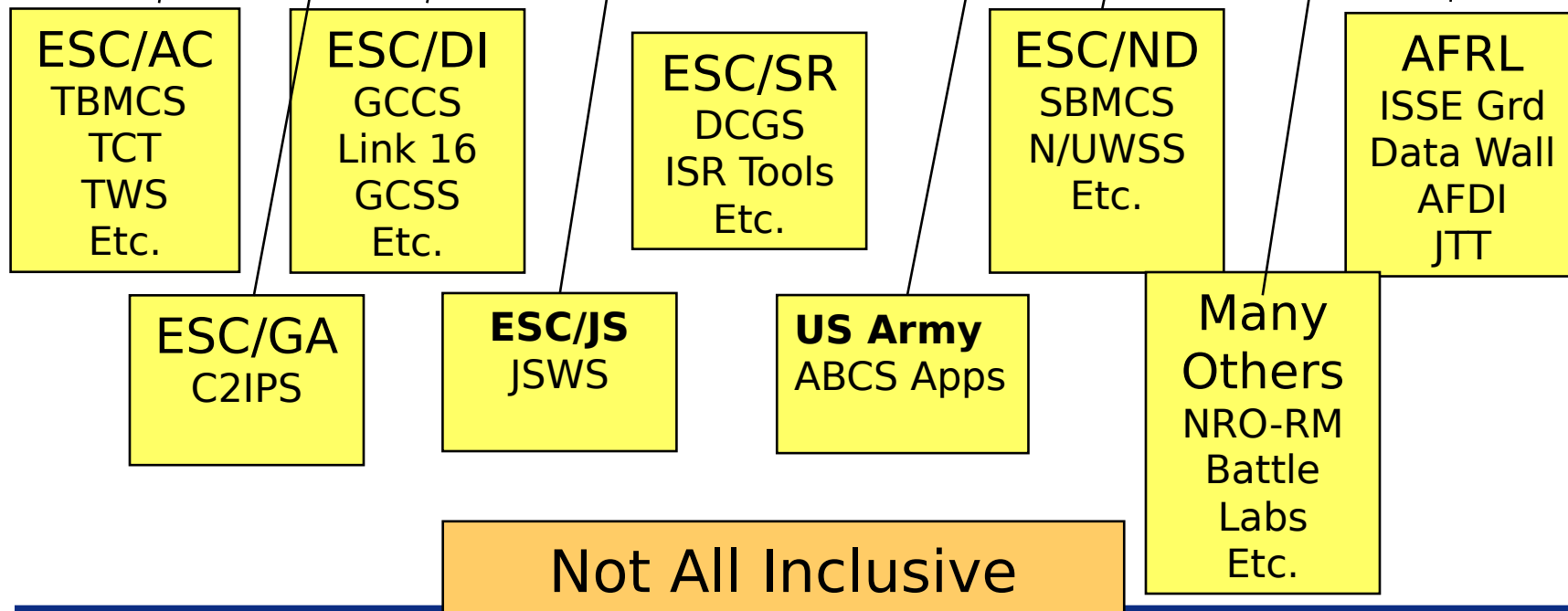




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# AOC Weapon System Block 10 Approach

## AOC Weapon System: Orchestrating & Integrating Efforts of Others

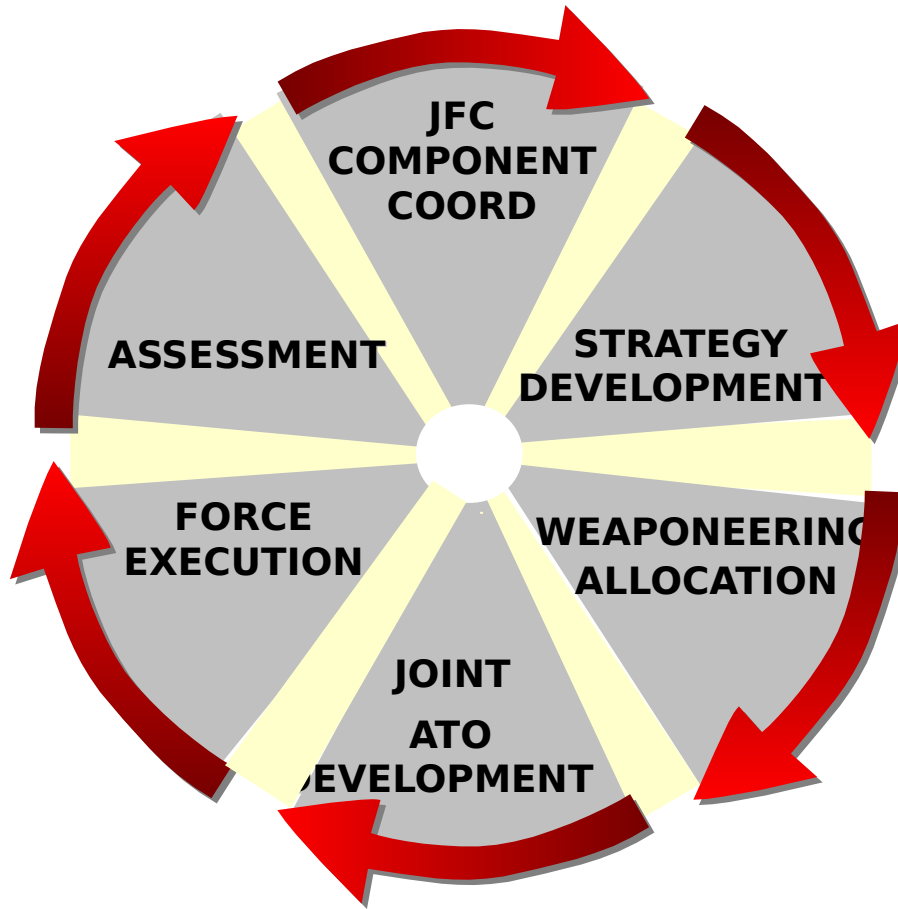




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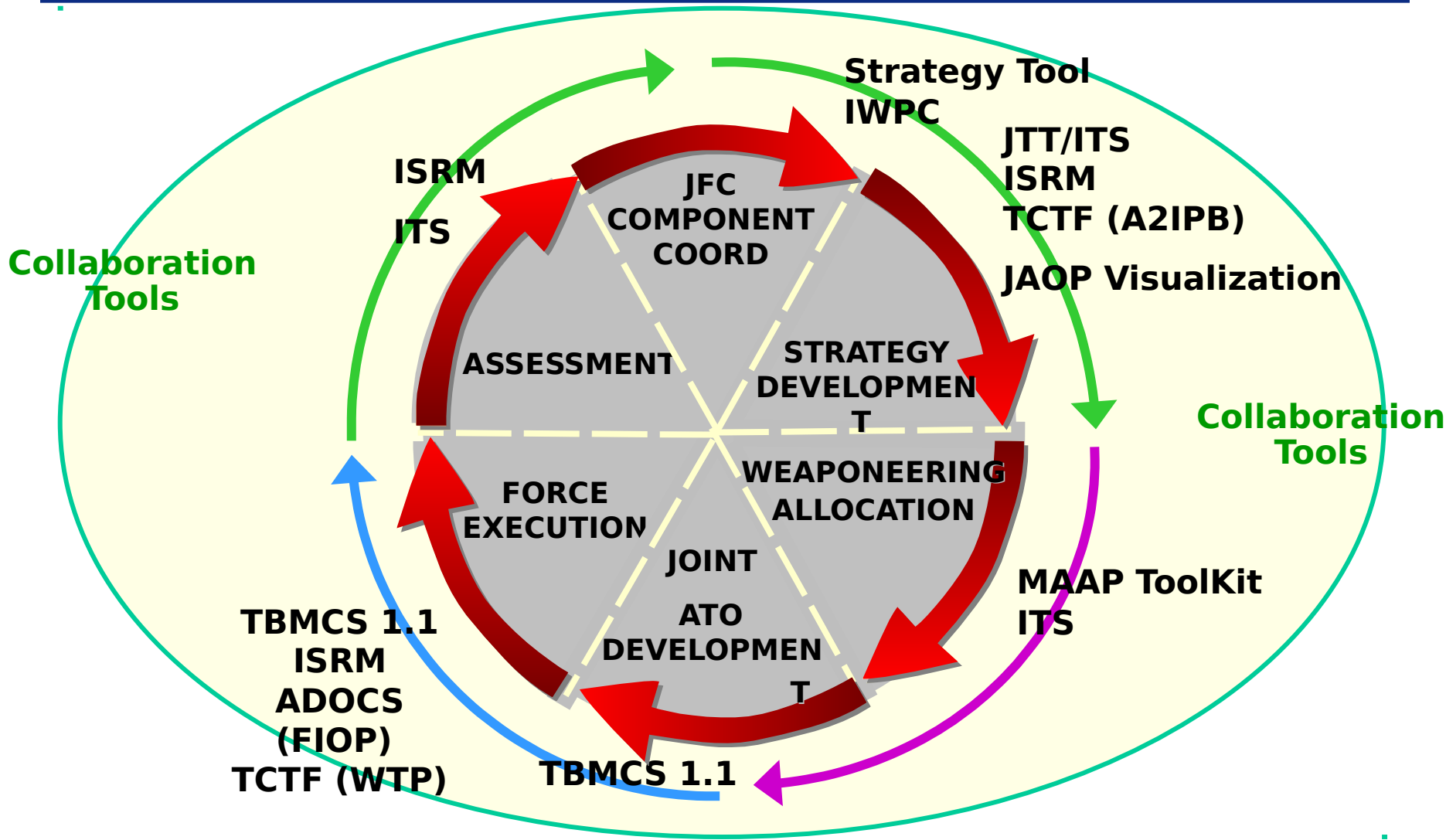
# ***Today's ATO Process***





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# Block 10 Near Term “System” Enhancements





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# ***Block 10.1 Development Strategy***

- **Used AUAB standup to:**
  - **Define an AOC baseline capabilities**
  - **Establish the modernization and support structure for the weapon system**
  
- **Used AF C2 Transformation Center to:**
  - **Refine concept of employment for ops**
  - **Reduce risk for AOC10.1 standup**
  - **Rapidly evaluate, assess, and field new capabilities**



# ***Block 10.1 System List***

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## **Capabilities**

- Improved ATO production & dissemination
- Common air picture
- Initial Formal Training Unit (FTU) infrastructure
- Initial Battlespace Visual.
- Initial TCT Capability
- Initial Plans Automation
- Initial ISR Management
- Limited Coalition Interop
- Transportable - limited deployability
- Improved M2M
- Initial Info Services Capability
- Airspace management
- Collaboration (chat)
- Comm/Info management
- Common weather picture
- IW/Space
- Air Mobility Coordination



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# ***AOC Configuration Management***

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- **Configuration Management critical for weapon system success**
  - **Baseline provides critical point of departure**
  - **Helps Establish training and sustainment requirements**
- **Departures from the baseline need to be controlled**
  - **JFACC needs confidence AOC will perform as expected**
  - **Helps establish capability improvement path, including best-of-breed home-grown solutions**
- **Common understanding helps field capabilities faster**
  - **Developers understand their charter**
  - **Testers know what to expect**
- **Streamlined configuration management provided by AOC SDIPT and Weapon System Program Director (SPD)**



# ***AOC Weapon System Training***

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- **Initial AFSC Skills - FTU**
  - **Initial Qualification Training: Weapon system specific**
    - **ACC/FTU**
      - **C2 Warrior School provides FTU for AOC**
      - **Initial Course Validation August...first student March 04**
  - **Mission Qualification Training: Theater-unique at unit**
  - **Continuation Training: At unit**
  - **Block / Increment Weapon System Upgrades**
    - **MTT follows Field Service Teams**
    - **FTU curriculum upgraded when required**
  - **Nellis CAOC**
    - **Advanced weapon system training**
    - **Academics for all Weapon School students**
    - **Operational level integration and senior leadership involvement**
- Trainers involved every step of the way**



# ***AOC Weapon System Testing***

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- **AOC Combined Test Force (CTF)—AFOTEC, 605TS, 46TS, ESC, AFC2ISRC & others as required.**
- **Team approach to testing requirements and test execution**
- **Assist preparing Spiral Development Increment Plans.**
  - **Early involvement in initiatives—total involvement in all phases of development**
  - **Recommend test approach**
  - **Coord test support for assessment / FDE / operational tests**
- **Conduct spiral assessments to provide TC / SDIPT inf**  
**Testers involved every step of the way**





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# ***Challenges Remain***

- **Few automated decision aids**
- **Ever-increasing sustainment costs with new capabilities**
- **Intelligence processing/ exploitation**
- **Limited bandwidth / interoperability / data latency**
- **Limited campaign strategy & assessment tools**
- **Limited dynamic tasking tools**
- **Limited fusion tools and processes**
- **Limited ISR management tools**
- **Limited target recognition tools**
- **Manually intensive sequential process**
- **No common air, ground, space picture**

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Alphabetic order



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# ***Standardization Summary***

- **PSAB and AUAB pathfinders for AOC WS**
  - **Became the “nerve centers” for OEF & OIF**
  - **AUAB modular concept essence of CSAF’s deployable vision**
- **Making great progress on FTU, HD, and HTACC now**
- **‘Weapon System’ processes put in place and continue to mature**
- **We will execute the CSAF’s direction for the AOC WS with a two-pronged approach**



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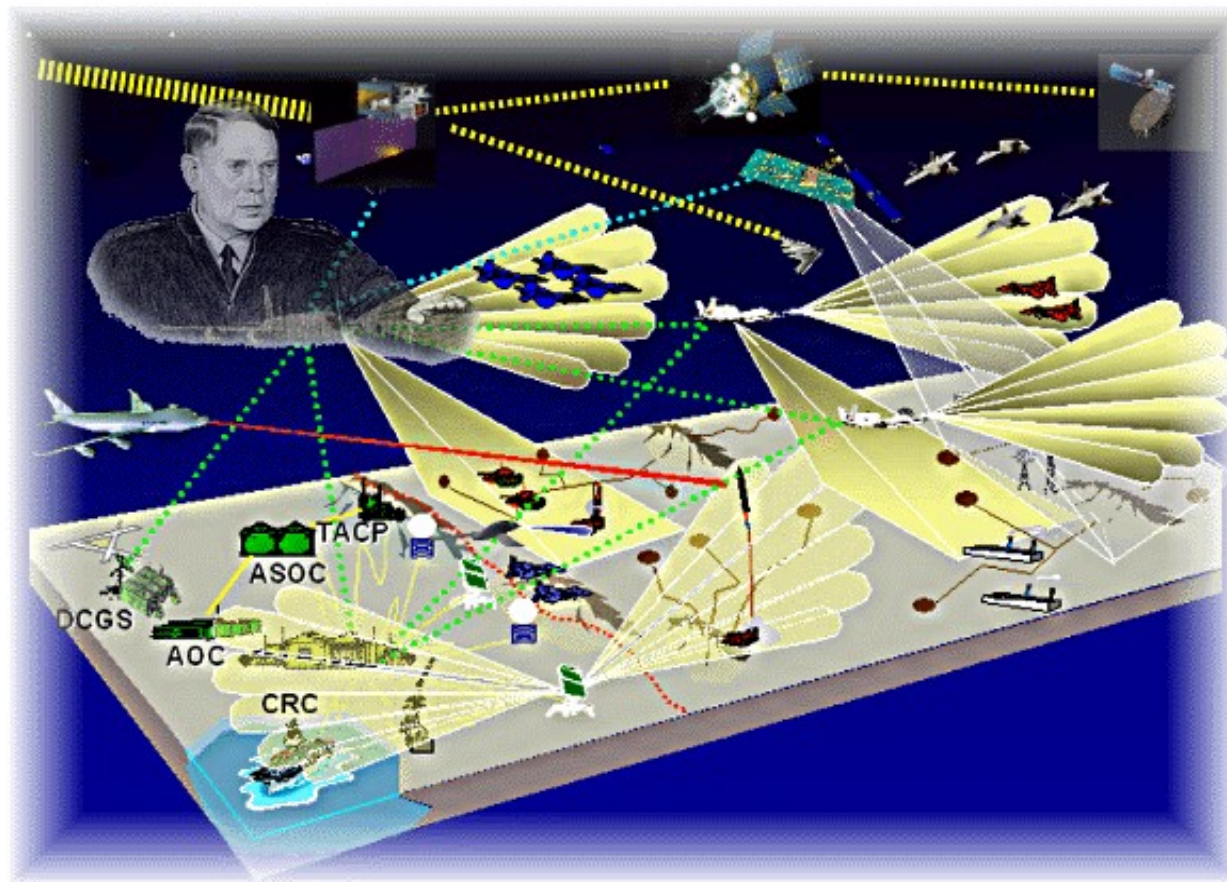
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# **Modernization**



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# ***Global Strike CONOPS***



**AOC WS is Key C2ISR node and enabler for GSTF**



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# ***AOC Modernization Mission***

**Close the seams in the “Kill Chain” between Find, Fix, Track, Target, Engage, and Assess. Integrate with the AOC...Other USAF, Coalition and Joint C2ISR Nodes along with manned, unmanned platforms, and space systems**

***Permits Employment of Forces in Transformational Way***

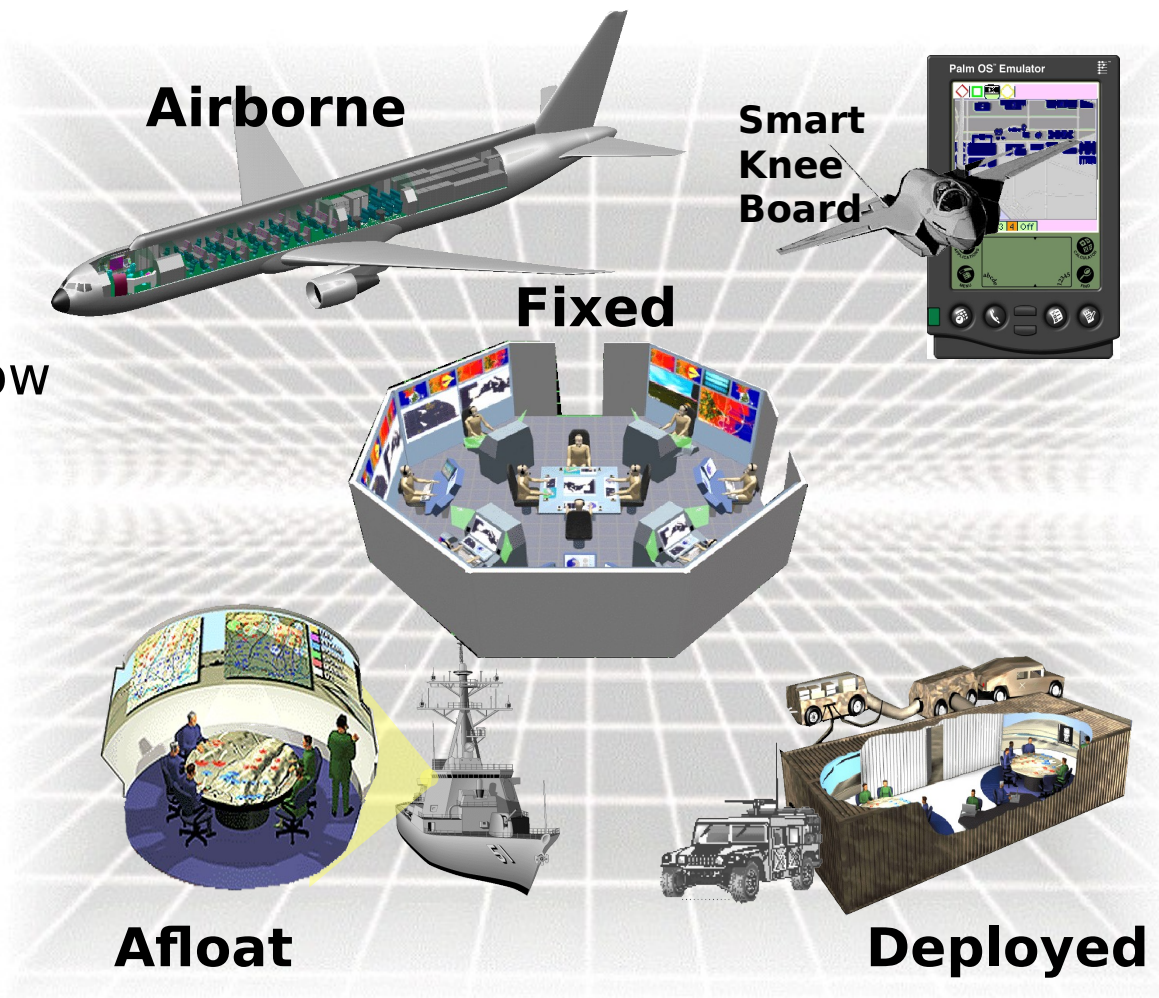




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# Advanced AOC Capabilities

- Automated
- Effects-based
- Intuitive decision aids
- Distributed workflow
- Advanced IO management
- Plug & play
- Configurable
- Scaleable
- Self-configuring
- Minimal staff
- Minimal support



***Multiple Applications - Expeditionary Combat to Force Protection***



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# ***Notional Vision for the Future Air Campaign Data***

Applications layer – ISR Manager, JTT, SDT, MAAP TK,  
etc

Enterprise Services layer – logon, security, email,  
browser, etc

Data (Information) Broker Layer

Information Access Layer

Intel Rules	Blue OB Rules	Logistics Rules	Plans Rules	Track Rules	Airspace Rules
Engine	Engine	Engine	Engine	Engine	Engine
Intel data	Blue OB data	Logistics data	Plans data	Track data	Logistics data



# ***Challenges***

- **Stovepipe Legacy Systems**
- **Private Data Bases**
- **IT Refresh Cycle**
- **Spiral Development and Horizontal Integration not well understood**
  - **Congress funds programs along platform lines**
  - **Lack of technology investment guidance**
- **What's in it for industry?**

We owe it to our troops to resolve these challenges

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# ***Transforming the AOC Weapon System***

	<b>Today</b>	<b>Next</b>	<b>Goal</b>
<b>CONOPs</b>	Target based, Node-centric, Theater focused	Point-to-Point Split Operations	Global Network-centric, Effects-based
<b>Process</b>	Manual / sequential	Assisted automation to current process	Re-engineered, Automated workflow, Dynamic Reconfigurability
<b>Tasking</b>	24hr batch ATO	Dynamic ATO	Dynamic Tasking
<b>Information</b>	Multiple non-interoperable systems & displays, individual databases	Publish / Subscribe, web-based, portals	User transparent automatic info discovery / routing, advanced integrated information infrastructure
<b>Personnel</b>	Manpower intensive,	Crew positions	Magnitude reduction
<b>Training</b>	Significant deficiencies, training intensive systems	FTU established	Position certified crew positions, intuitive systems
<b>Systems</b>	Stovepipe, pasted together, non-coalition, on-site sys admin	Configuration Controlled System of systems, remote sys admin	Plug-play-throw away, Secure, wireless, interoperable, adv computing platforms, automated / end user sys admin
<b>Sustainment</b>	Very expensive!	Reduced	Magnitude reduction



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# AF/GS CONOPS Operational Capabilities Required

FY07-FY08	FY08-FY09	FY10-FY11
<b>Increment 2 (10.2)</b> <ul style="list-style-type: none"><li>• Auto strategy/assessment; w/ JAOP, COA's, M&amp;S</li><li>• Airspace Deconfliction: 3D visual planning/execution</li><li>• TBMCS Web enable and XML data formats/services</li><li>• Auto target selection and management</li><li>• Semi-automate BDA information management</li><li>• Automated planning and assessment processes</li><li>• High assurance guards for coalition</li></ul>	<b>Increment 3 (10.3)</b> <ul style="list-style-type: none"><li>• Reduced manning to support Theater Response Package</li><li>• Airspace deconfliction automation for new weapons</li><li>• Full Spectrum ISR Mgt with sensor mgt, limited fusion</li><li>• Information Mgt system to collect, archive, and tailor</li><li>• Multi-level security environ with dynamic reconfiguration</li><li>• Improved target mensuration and target recognition</li></ul>	<b>Increment 4 (10.4)</b> <ul style="list-style-type: none"><li>• Rapidly deployable, scalable, reconfigurable, smaller footprint</li><li>• Fusion of air, ground, and space information into single picture</li><li>• Automate effects based ops to support planning &amp; assessment</li><li>• Modeling and simulation of terrain, weather, WMDs, etc</li><li>• Hi resolution visualization with Information Operations info</li><li>• Smart agent cognitive reasoning decision aids for COAs</li><li>• Target recognition of TS</li></ul>



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# ***Notional Future AOC Block 10, Increment 2 Prioritized Capabilities***

- **Strategy and Assessment Automation:** Provides machine-to-machine strategy information exchange for Joint Air Operations Plan, COA templating, modeling, and auto COA prediction (e.g. eliminate re-typing information)
- **Airspace Deconfliction:** 3-Dimensional visual depiction of air vehicles to support airspace deconfliction planning and execution functions
- **TBMCS Web Enable and XML:** Transitions from proprietary formats and specialized services to XML data formats and web services for exchange with Space, Mobility, and other force providers
- **Target Process Automation:** Semi-automate mensuration, target collection, target cueing, target development, collection management, and synchronize targeting
- **Planning Automation:** Machine-to-machine data exchange with Guidance Apportionment and Targeting / JIPTL, and Airspace Deconfliction Systems
- **Improve Coalition Interoperability:** High assurance guards to automatically exchange info between US and coalition environment
- **Semi-automate bomb damage assessment information management processes to rapidly identify results**



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# ***Notional Future AOC Block 10, Increment 3 Prioritized Capabilities***

- **Reduced Manning:** Reduce # of personnel required to support Theater Response Package (200 seats (T)/ 150 seats (O))
- **Enhanced Airspace Deconfliction:** Automated airspace deconfliction for stealth, predator, and Precision Guided Munitions
- **Full Spectrum ISR Management:** automated routing and sensor management, fusion (level 2), and dynamic target re-tasking
- **Information Management:** System to collect, archive, cross-reference, and tailor information based on requirement
- **Reconfigurable Multi-Level Security Environment:** Ability to rapidly reconfigure workstation with single log-on to support any AOC position and receive multiple security levels of information
- **Improved Target Mensuration and Auto Recognition:** Ability to automatically recognize targets and mensurate them in 1 minute or less
- **Distributed Mission Operations** with virtual simulation between AOC, C2 systems, and other simulators, to support Continuation Training



# ***Notional Future AOC Block 10,***

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## ***Increment 4 Prioritized Capabilities***

- **Rapid Deployability, Scaleable/Reconfigurable, and Smaller Footprint:** Ability to rapidly deploy with a smaller footprint and rapidly configure systems to meet any level of conflict w/ 50% reduction in weight/cube
- **Network Centric Architecture and Services :** Automated web services with extensive reachback for rapid data exchange
- **Fusion:** Fusion (Level 3) of air, ground, and space information into a single common picture of the battlespace
- **Effects Based Operations:** Automated effects based combat planning, operations, and assessment to support any contingency
- **Modeling and Simulation:** Improved modeling/simulation to account for different theater environments (variations in terrain, climate, Weapons of Mass Destruction)
- **Hi Resolution Visualization:** Hi definition 3-Dimensional visualization of battlespace with Information Operations added picture
- **Smart Agent:** Advanced machine cognitive reasoning decision aids to provide recommended COAs and shorten decision making process



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# ***Modernization Strategy***

- **Document an “As-Is” Architecture for AOC Block 10.1**
  - Collect and analyze data to document the AOC Block 10.1 baseline (applications, services, and infrastructure)
  - Graphically depict AOC integration efforts to include: version and spiral release dates of AOC applications, timelines for integration, cost of capabilities, cost to integrate capabilities, and Government and industry points contact for AOC integration
- **Conduct AOC Block 10.1 Gap/Overlap Analysis**
  - Determine AOC capability overlaps and gaps and will compare findings with AOC ORD requirements
  - Make recommendations to support fielding and implementation of new AOC capabilities and configurations
  - Propose solutions to increase overall AOC efficiency
  - Define security procedures related to technical requirements, and operational procedures required to minimize impact on operations
  - Assess the capabilities of Service, Joint, Allied, and Coalition AOC-related systems
- **Document a “To-Be” Architecture for future AOC Increments & Blocks**



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# ***Architecture Benefits and Uses***

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- **Help us determine where we have holes and redundancies in meeting ORD requirements**
- **Help to identify which SF's are unsupported**
- **Evaluate replacement or redundant systems**
- **Determine funding requirements**
- **Evaluate new proposed systems**
- **Aid in test plan development and MOE development**
- **ID potential information services**
- **Evaluate Baseline Change Requests**
- **Generate missing performance requirements**
- **Allow component systems to focus development efforts to fill AOC gaps**



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# ***Architecture What Are We Doing?***

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- **Focuses:**
  - **System-to-Function Mapping**
    - Allows capability-driven planning
    - Reflects shift from integration contract (emphasizing the externals) to spiral development (improving the whole)
  - **Integration of AOC WS V1.0 Architecture with other, classified architectures**
- **Ad Hoc:**
  - **Updating diagrams and definitions based on continued research and comments received from users**





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# **As-Is Ops Architecture**

- **Version 1.0 (Theater Focus) - Released Aug 00**
  - **AF theater C2&ISR nodes**
    - **High-level activities and major information exchanges**
    - **MTW focus, 2000-2004 timeframe**
    - **Products: AV-1/2, OV-1/2/3/4 (6-page brochure and CD)**
    - **Includes AOC Functional Decomposition**
    - **Defines As-Is AOC Activities in more detail**
      - **NAF review/validation underway**
      - **ESC TBMCS architecture office reviewing**
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# **To-Be Ops Architecture**

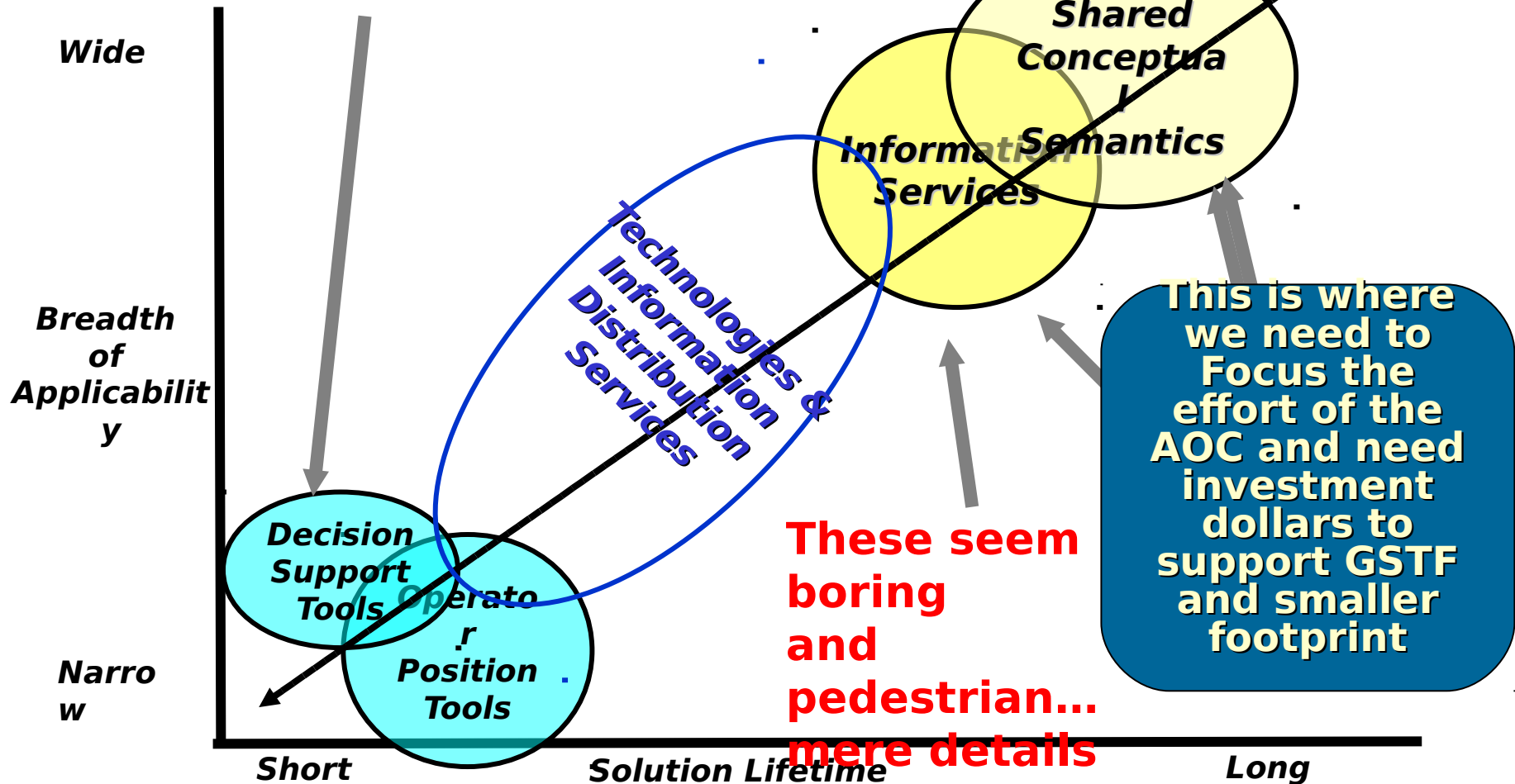
- **AF theater C2&ISR capabilities**
  - **High-level activities and major information flows**
  - **MTW focus, 2005-2013 timeframe**
  - **“Evolved” from As-is Activities Using Critical Capabilities as a guide**
  - **Products: AV-1/2, OV-1/2/3**



# What Holds Us Captive?

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**These water eyes**





# ***The Long-Term Vision***

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- **Automated 4D common operational picture (air, land, space, time)**
- **Fully-automated effects-based operations to support planning, execution, and assessment**
- **Automate collaboration with other weapons systems**
- **Automated Global Information Grid**



# ***Modernization Summary***

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- **AOC Weapon System:**
  - **Significant progress to date**
  - **Current integration still very dependent upon information pulling, human dependency, stovepipes (People are the network)**
  - **AUAB drives Block 10.1**
  - **Path to subsequent Blocks and the Next Generation**
    - **CONOPS/CCD provides direction**
    - **CAOC-X provides the vehicle**

**AOC Weapon System modernization is now a reality**



# ***Industry's Role***

- **Assume the Lead System Integrator role from the government on AOCs**
  - **Increase System Engineering rigor**
  - **Bring commercial approaches to solving problems**
  - **Continuity of operations**
- **Help define the scope of and accomplish the Lead System Integrator (LSI) tasks**
- **Work collaboratively with Gov't to integrate and deliver improved operational capabilities into the AOC**



# ***Notional LSI Tasks***

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- **Conduct system and sustaining engineering activities for a complex adaptable system**
  - **Facilitate spiral innovation, integration testing, & AOC Process Re-engineering**
  - **Field AOCs and training suites**
    - **Site surveys, engineer and design, direct installs, check out, SMEs**
  - **Define, establish and maintain/evolve AOC Infostructure Baseline**
    - **Conduct system engineering and sustaining engineering activities**
    - **Establish integrated info-services framework for AOC based on commercial standards**
    - **Integrate Joint and Space Framework**
    - **Migrate current AOC applications (TBMCS & other Apps) to fit framework**
    - **Oversee migration of future AOC applications**
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# ***Notional LSI Tasks***

## ***(Continued)***

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- **Establish a process and methodology to evaluate and recommend candidate applications**
  - **Develop and maintain an AOC developers' network**
  - **Technical evaluation of consistency**
  - **Government owns down-select authority**
  - **Integrate applications**
- **Define, design, and field Blocks 10.2/10.3/10.4**
  - **Content based on AFROC approved CDDs and CPDs**
  - **Maintain enterprise architecture**
  - **Maintain standards and protocols**
  - **Help us choose best of breed**
- **Perform sustainment responsibilities**
  - **SMEs (Site teams)**
  - **SW licenses/seat fees**
  - **CM support to sites**
  - **H/W replacement (?)**





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# ***Notional LSI Tasks (Cont)***

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- **Develop and conduct type 1 training**
- **Develop and publish Tech Orders**
- **Accomplish configuration management**
  - **Maintains current technical baseline of applications in AOC**
  - **Ensures AOCs are physically and functionally adhering to baseline**